

Session: Assessing Risks of Pesticides to Federally Listed (Threatened and Endangered) Species at a National Level

Title: Conservation of lepidopteran ecdysteroid receptor provides evidence for butterfly susceptibility to diacylhydrazine and bisacylhydrazine chemicals

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Diacylhydrazine (DAH) and bisacylhydrazine (BAH) chemicals (e.g., methoxyfenozide and tebufenozide, respectively), also known as moulting –accelerating compounds, act as agonists of the ecdysteroid receptor (EcR), and have been used as selective insecticides for pests within the order Lepidoptera (e.g., armyworms, moths, budworms). Using the U.S. Environmental Protection Agency Sequence Alignment to Predict Across Species Susceptibility (SeqAPASS) tool we examined the structural conservation of the EcR across species. Consistent with current literature, the primary amino acid sequence and ligand-binding domain for EcR were well conserved across invertebrates, however examination of key amino acids understood to be important for docking of DAH and BAH structures to insect EcR revealed potentially important cross-species differences. Predictions from the SeqAPASS analysis indicate that hymenopteran species (e.g., honey bee, bumble bee) are less likely to be susceptible to these chemicals than some other insects. Conversely, due to the amino acid sequence similarity across lepidopteran species, particularly at residue positions identified as important for proper EcR conformation during DAH and BAH binding, SeqAPASS data predict relative intrinsic susceptibility to be likely for three butterfly species (i.e., all those with available EcR sequence data), including the monarch butterfly (*Danaus plexippus*). This suggest that further research may be needed to examine the effects of these pesticides on butterfly species, some of which may be endangered. *The contents of this abstract neither constitute nor reflect official US EPA policy.*